I CLAIM:

1. A process for recovering precious metal values from a concentrate of precious metal bearing refractory sulfide minerals, comprising:

a. distributing the concentrate of refractory sulfide minerals on top of a heap of support material;

b. biooxidizing the concentrate of refractory sulfide minerals;

c. leaching precious metal values from the biooxidized refractory sulfide minerals with a lixiviant; and

d. recovering precious metal values from the lixiviant.

2. A process according to claim 1, wherein the precious metal recovered from the lixiviant is at least one selected from the group consisting of gold, silver and platinum.

3. A process according to claim 1, wherein the precious metal recovered from the lixiviant is gold.

4. A process according to claim 1, wherein the support material is selected from the group consisting of lava rock, gravel, and coarsely ground ore.

5. A process according to claim 1, wherein the support material is lava rock.

6. A process according to claim 1, wherein the lixiviant is selected from the group consisting of thiourea and cyanide.

7. A process according to claim 1, wherein the lixiviant is thiourea.

8. A process according to claim 1, further comprising adding fresh concentrate to the top of the heap on an intermittent basis.

9. A process according to claim 8, wherein the precious metal values are intermittently leached from the biooxidized refractory sulfide minerals with thiourea.

10. A process for recovering precious metal values from a concentrate of precious metal bearing refractory sulfide minerals, comprising:

a. distributing the concentrate of refractory sulfide minerals on top of a heap of support material, wherein the support material is selected from the group consisting of lava rock, gravel, and coarsely ground ore;

b. biooxidizing the concentrate of refractory sulfide minerals;

c. leaching precious metal values from the biooxidized refractory sulfide minerals with a lixiviant; and

d. recovering precious metal values from the lixiviant.

11. A method according to claim 10, wherein the precious metal recovered is selected from the group consisting of gold, silver, and platinum.

12. A method according to claim 10, wherein the lixiviant is selected from the group consisting of thiourea and cyanide.

13. A process according to claim 10, further comprising adding fresh concentrate to the top of the heap on an intermittent basis.

14. A process according to claim 10, wherein the precious metal values are intermittently leached from the biooxidized refractory sulfide minerals with thiourea.

15. A process for recovering gold values from a concentrate of gold bearing refractory sulfide minerals, comprising:

a. distributing the concentrate of refractory sulfide minerals on top of a heap of support material, wherein the support material is selected from the group consisting of lava rock, gravel, and coarsely ground ore;

b. biooxidizing the concentrate of refractory sulfide minerals;

c. adding fresh concentrate to the top of the heap on an intermittent basis;

d. intermittently leaching gold from the biooxidized refractory sulfide minerals with thiourea; and

e. recovering gold values from the thiourea.

16. A process for recovering metal values from a sulfide ore, comprising:

a. forming a concentrate of metal sulfide minerals;

b. spreading the concentrate on top of a heap of support material;

c. biooxidizing the concentrate; and

d. recovering metal values from the solution used to biooxidize the metal sulfide minerals.

17. A method according to claim 16, wherein the metal values recovered are selected from the group consisting of copper, zinc, nickel, and uranium.

18. A method according to claim 16, wherein the metal recovered is copper.

19. A process according to claim 16, wherein the support material is selected from the group consisting of lava rock, gravel, and coarsely ground rock.

20. A process according to claim 16, wherein the support material is lava rock.

21. A process according to claim 16, further comprising adding fresh concentrate to the top of the heap on an intermittent basis.

22. A process for recovering metal values from a sulfide ore, comprising:

a. forming a concentrate of metal sulfide minerals;

b. spreading the concentrate on top of a heap of support material, wherein the support material is selected from the group consisting of lava rock, gravel, and coarsely ground rock;

c. biooxidizing the concentrate;

d. adding fresh concentrate to the top of the heap on an intermittent basis; and

e. recovering metal values from the solution used to biooxidize the metal sulfide minerals.

23. A process according to claim 22, wherein the support material is lava rock.

24. A process according to claim 22, wherein the metal recovered is selected from the group consisting of copper, zinc, nickel, and uranium.

25. A process according to claim 22, wherein the metal recovered is copper.

26. A method for recovering metal values from refractory sulfide ores comprised of metal sulfide particles, the process comprising the steps of

a. separating fines from a crushed refractory sulfide ore;

b. forming a heap with said refractory sulfide ore;

c. bioleaching the ore in said heap to thereby oxidize the metal sulfide particles contained therein;

d. hydrometallurgically treating the bioleached ore to recover metal values; and

f. treating the separated fines to recover metal values contained therein.

27. A method for recovering precious metal values from refractory sulfide ores comprised of metal sulfide particles having occluded precious metal values, the process comprising the steps of:

a. separating fines from a crushed refractory sulfide ore;

b. forming a heap with said refractory sulfide ore;

c. bioleaching the ore in said heap to thereby oxidize the metal sulfide particles contained therein;

d. hydrometallurigically treating the bioleached ore to recover precious metal values; and

e. treating the separated fines to recover precious metal values contained therein.

28. A method according to claim 27, wherein said method of fines treatment comprises:

a. separating precious metal containing metal sulfide particles from the fines;

b. oxidizing said metal sulfide particles; and

c. hydrometallurgically treating said oxidized metal sulfide particles to recover precious metal values contained therein.

29. A method according to claim 28, further comprising:

a. agglomerating the fines after separation of said metal sulfide particles; and

b. hydrometallurgically treating said agglomerated fines to recover precious metal values.

30. A method according to claim 27, wherein said method of fines treatment comprises:

a. separating precious metal containing metal sulfide particles from the fines; and

b. adding said metal sulfide particles to the heap.

31. A method according to claim 30, further comprising:

a. agglomerating the fines after separation of said metal sulfide particles; and

b. hydrometallurgically treating said agglomerated fines to recover precious metal values.

32. A method according to claim 27, wherein said method of fines treatment comprises:

a. separating precious metal containing metal sulfide particles from the fines;

b. hydrometallurgically treating said metal sulfide particles to recover nonrefractory precious metal values;

c. oxidizing said metal sulfide particles; and

d. hydrometallurgically treating said oxidized metal sulfide particles to recover additional precious metal values.

33. A method according to claim 32 further comprising:

a. agglomerating the fines after separation of said metal sulfide particles; and

b. hydrometallurgically treating said agglomerated fines to recover precious metal values.

34. A method according to claim 27, wherein said method of fines treatment comprises:

a. separating precious metal containing metal sulfide particles from the fines;

b. hydrometallurgically treating said metal sulfide particles to recover nonrefractory precious metal values; and

c. adding the hydrometallurgically treated metal sulfide particles to the heap.

35. A method according to claim 34, further comprising:

a. agglomerating the fines after separation of said metal sulfide particles; and

b. hydrometallurgically treating said agglomerated fines to recover precious metal values.

36. A method according to claim 27, wherein said hydrometallurgical treatment comprises leaching said heap with a lixiviant selected from the group consisting of cyanide and thiourea.

37. A method according to claim 27, wherein said hydrometallurgical treatment comprises leaching said heap with cyanide.

38. A method according to claim 27, wherein said crushed

refractory sulfide ore has a maximum particle size in the range of approximately 1/4 inch to 1 inch, and said fines have a maximum particle size of about -60 mesh to -1/8 inch.

39. A method according to claim 27, wherein the recovered precious metal is at least one metal selected from the group consisting of gold, silver, and platinum.

40. A method according to claim 27, wherein the recovered precious metal is gold.

41. A method according to claim 28, wherein said separated metal sulfide particles arc oxidized by biooxidation.

42. A method according to claim 32, wherein said separated metal sulfide particles are oxidized by biooxidation.

43. A method according to claim 28, wherein said metal sulfide particles are separated from the fines by a method selected from the group consisting of gravity separation and flotation.

44. A method according to claim 32, wherein said metal sulfide particles are separated from the fines by a method selected from the group consisting of gravity separation and flotation.

45. A method according to claim 27, further comprising

treating the bioleached ore to inhibit pregrobbing by carbonaceous components contained therein.